

Andre Kornell

Curriculum Vitae

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Education

- 2015 **Ph.D.**, *University of California, Berkeley*, Mathematics
2006 **A.B.**, *Princeton University*, Mathematics

Employment

- 2024–present **Postdoctoral Fellow in Mathematics**, *New Mexico State University*
2022–2024 **Research Associate in Mathematics**, *Dalhousie University*
2019–2022 **Postdoctoral Fellow in Computer Science**, *Tulane University*
2018–2019 **Lecturer in Mathematics**, *University of California, Davis*
2015–2018 **Visiting Assistant Professor of Mathematics**, *University of California, Davis*

Awards

- 2024 **Birkhoff-von Neumann Prize**, *International Quantum Structures Association*

Publications

- G. Bezhanishvili and A. Kornell, *The category of topological spaces and open maps does not have products*, *Advances in Mathematics* **458**, pt. A, 109963 (2024).
- J. Harding and A. Kornell, *Completely hereditarily atomic OMLs*, *Mathematica Slovaca* **74**, no. 5, 1107–1126 (2024).
- A. Kornell, *A natural deduction system for orthomodular logic*, *Review of Symbolic Logic* **17**, no. 3, 910–949 (2024).
- A. Kornell, B. Lindenhovius, and M. Mislove, *Categories of quantum cpos*, *arXiv:2406.01816* (2024).
- C. Heunen, A. Kornell, and N. van der Schaaf, *Axioms for the category of Hilbert spaces and linear contractions*, *Bulletin of the London Mathematical Society* **56**, no. 4, 1532–1549 (2024).
- A. Kornell, *Discrete quantum structures II: Examples*, *Journal of Noncommutative Geometry* **18**, no. 2, 411–450 (2024).
- A. Kornell, *Characterizations of homomorphisms among unital completely positive maps*, *arXiv:2403.07229* (2024).
- A. Kornell, *Discrete quantum structures I: Quantum predicate logic*, *Journal of Noncommutative Geometry* **18**, no. 1, 337–382 (2024).
- A. Kornell and P. Selinger, *Some improvements to product formula circuits for Hamiltonian simulation*, *arXiv:2310.12256* (2023).
- G. Bezhanishvili and A. Kornell, *On the structure of modal and tense operators on a Boolean algebra*, *arXiv:2308.08664* (2023).
- A. Kornell, *Axioms for the category of sets and relations*, *arXiv:2302.14153* (2023).

- A. Kornell, B. Lindenhovius, and M. Mislove, *A category of quantum posets*, *Indagationes Mathematicae* **33**, no. 6, 1137–1171 (2022).
- C. Heunen and A. Kornell, *Axioms for the category of Hilbert spaces*, *Proceedings of the National Academy of Sciences of the United States of America* **119**, no. 9, e2117024119 (2022).
- X. Jia, A. Kornell, B. Lindenhovius, M. Mislove, and V. Zamdzhiev, *Semantics for Variational Quantum Programming*, *Proceedings 49th ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2022)*, *Proceedings of the ACM on Programming Languages* **6**, 26, 1–31 (2022).
- A. Kornell, B. Lindenhovius, and M. Mislove, *Quantum CPOs*, *Proceedings 17th International Conference on Quantum Physics and Logic (QPL 2020)*, *Electronic Proceedings in Theoretical Computer Science* **340**, 174–187 (2021).
- A. Kornell, *Quantum sets*, *Journal of Mathematical Physics* **61**, 102202 (2020).
- A. Kornell, *Quantum extensions of ordinary maps*, *Proceedings of the American Mathematical Society* **148**, 1971–1986 (2020).
- A. Kornell, *Quantum collections*, *International Journal of Mathematics* **28**, no. 12, 1750085 (2017).

Talks

- From quantum uncertainty to quantum groups*, Quantum Structures, Free University of Brussels (2024), invited.
- On the category of sets and relations*, Boolean algebras, Lattices, Universal Algebra, Set Theory, and Topology, University of South Carolina at Charlotte (2023), plenary.
- Categories of Hilbert spaces*, AMS Spring Western Sectional Meeting, California State University, Fresno (2023), invited.
- Bounded operators and binary relations*, Logic Seminar, University of Ottawa (2023), invited.
- Categories of Hilbert spaces*, New York City Noncommutative Geometry Seminar (2023), invited.
- Four categories of Hilbert spaces*, Colloquium, New Mexico State University (2022), invited.
- Categories as predicate models*, Foundations Seminar, New Mexico State University (2022), invited.
- Natural deduction in quantum logic*, Boolean algebras, Lattices, Universal Algebra, Set Theory, and Topology, Chapman University (2022).
- Axioms for the category of Hilbert spaces*, Topos Institute (2022), invited.
- Natural deduction in quantum logic*, Quantum Structures, Calabria (2022).
- Natural deduction in quantum logic*, Quantum Physics and Logic, University of Oxford (2022).
- Natural deduction in quantum logic*, Applied Logic, Philosophy, and History of Science Seminar (2021), invited.
- Quantum posets and quantum powersets*, AMS Spring Western Sectional Meeting (2021), invited.
- Finite quantum structures*, New York City Noncommutative Geometry Seminar (2020), invited.
- Quantum predicate logic with equality*, International Conference on Quantum Physics and Logic (2020).
- Quantum CPOs*, Programming Languages for Quantum Computing, Principles of Programming Languages, New Orleans (2020).
- Analogs of functions in quantum information theory*, Quantum Information at LSU and Tulane, Tulane University (2019).

Interpreting propositions in discrete quantum structures, Focused Research Group on Noncommutative Mathematics and Quantum Information, University of Bristol (2019), invited.

Quantum extensions of ordinary maps, Analysis Seminar, University of Waterloo (2019).

Quantum sets, Symposium on Compositional Structures, University of Birmingham (2018).

Quantum extensions of ordinary maps, Oxford Advanced Seminar on Informatic Structures, University of Oxford (2018).

The logic of Σ formulas, Boolean algebras, Lattices, Universal Algebra, Set Theory, and Topology, University of Denver (2018).

Reasoning about incomplete structures, AMS-ASL Special Session on Set Theory, Logic, and Ramsey Theory, Joint Mathematics Meetings, San Diego (2018).

Operator algebras when every set is Lebesgue measurable, Subfactor Seminar, Vanderbilt University (2014).

V-algebras*, East Coast Operator Algebras Symposium, Fields Institute (2014).

Dodging the quantum set problem, Great Plains Operator Theory Symposium, University of California, Berkeley (2013).

On the category of von Neumann algebras, West Coast Operator Algebras Seminar, University of Oregon (2012), invited.

Teaching

New Mexico State University

2024 Math 401/530: Mathematics of Quantum Information

Dalhousie University

2023 CSCI 1300: Calculus in Computer Science

University of California, Davis

2019 MAT 16A: Short Calculus

2018 MAT 21A: Calculus

MAT 108: Introduction to Abstract Mathematics

MAT 199: Special Study for Advanced Undergraduates

MAT 17B: Calculus for Biology and Medicine

2017 MAT 21A: Calculus

MAT 215A: Topology

MAT 21C: Calculus

MAT 202: Functional Analysis

2016 MAT 147: Topology

MAT 16C: Short Calculus

MAT 108: Introduction to Abstract Mathematics

MAT 125A: Real Analysis

2015 MAT 125A: Real Analysis

University of California, Berkeley

2007 MAT 53: Multivariable Calculus